KEWTECH

KTD40
Multifunction Digital Loop Impedance Tester

User Manual

www.kewtechcorp.com

The Kewtech KTD40 Loop Impedence Tester is designed for use by suitably qualified personnel familiar with electrical supply systems.

Caution

Before using your KTD40 please read these instructions; in particular note the safety issues that follow:

- Although fully protected up to 440V AC this tester is for use on 230V AC circuits only.
- Always check the tester on a known, correctly wired, live socket outlet before and after use.
- Before use check your tester for any damage to the plug, lead and cabinet.

Important calibration/check box note

- Because of the Super Smart Loop Test System the test is immune to sudden value changes (such as voltage spikes).
- As a result when changing calibration or check box loop values the unit must be switched off between changes.

CE BS EN 61010-1

At Kewtech our engineers constantly look for improvement. If there is any aspect of your Kewtech tester you would like to comment on please visit our website at

Kewtechcorp.com

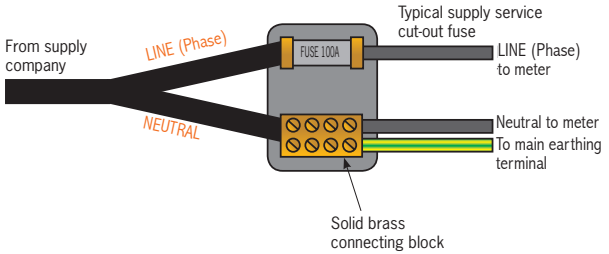
Operation Overview

Your Kewtech tester has a special polarity test function.

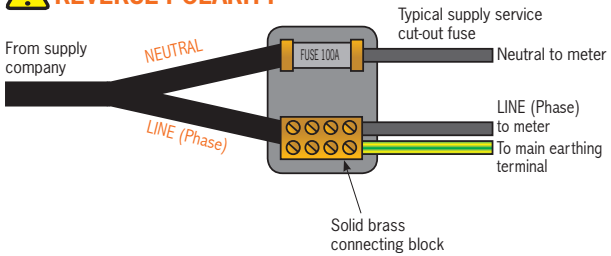
It is a little known fact that a system can be reverse wired with Line (Phase) to earth/ neutral and earth/neutral to Line (Phase). The sockets will all work and conventional loop testers will show and test that everything is correct despite this very dangerous wiring condition.

Although extremely rare, this miswire condition can exist so if your test shows this fault do not proceed – if in any doubt advise your customer to contact their supply company immediately. (See test step 3, page 9)

CORRECT POLARITY



REVERSE POLARITY



Operation overview

The KTD40 will test for No-trip loop, High current True Loop Impedance, No-trip PFC/PSC (Prospective Fault Current), High current PSC using True Loop Impedance, mains voltage (L-N, L-E and N-E) and correct socket wiring, in addition to the incoming supply polarity check described on the previous page.

Another unique feature of your KTD40 tester is the high current 2-wire measurement of the TLI (True Loop Impedance). Regulations and guidance books refer to loop impedance measurements but up until now loop testers measured loop resistance which is different from loop impedance, particularly when testing close to the main supply transformer.

This function is therefore recommended when testing for external earth fault loop impedance (Ze) at distribution boards on non TT systems and similar points on the supply side of any Switch/RCD gear and when testing the Line/Neutral loop to determine prospective short circuit current.

It is the variation in power factor that makes the TLI measurement of your KTD40 so much more accurate than older loop testing techniques. (Because of this there may well be variations in readings compared to ordinary loop testers or the no-trip function of this tester, particularly when the measurement is made near to the main supply transformer).

The KTD40 also has a No-trip test mode that is guaranteed not to trip a 30mA or higher rated RCD providing that the circuit is otherwise healthy.

No-trip vs High current testing

Although the KTD40 High current TLI measurement mode is inherently more accurate than conventional techniques when measuring close to the main supply transformer, the difference between resistance and true impedance reduces the further away from the transformer the measurement is made.

This is why using the No-trip mode is suitable for measurement on final circuits and similarly remote points. It should be noted however that whilst No-trip testing at these locations will normally function at a similar high level of accuracy, the low current measurement technique used is more likely to be adversely affected by external factors such as contact resistance (e.g. when testing at seldom used socket outlets) and circuit noise (e.g. switched mode power supply on the same circuit). This can result in the occasional erroneous reading.

For this reason it is recommended that multiple measurements are made when using the No-trip mode and any isolated odd results are ignored. When taking multiple readings the tester or the supply should be powered off between consecutive tests. Where practical other equipment powered by the same socket should be turned off.

For safety reasons No-trip mode is recommended for all measurements made on TT systems.

Test lead configuration

Important

The KTD40 can be used with 2 different types of connecting lead. It is important to understand and use the correct lead configuration for each test mode or you may not obtain the correct results.

Lead options

1 Ref: KAMP13 The mains lead (IEC C13 to 13A plug) type connector that is supplied with the tester.

2 Ref: ACC016E The 3-Pole fused distribution board test lead set which terminates in fused prods/crocodile clips. This is supplied as a separate accessory to the KTD40.

The lead is an integral part of the tester set-up and should accompany the tester when being returned for re-calibration or service. Do not use any other type of mains lead or fused test lead set as it would be likely to give incorrect results.

Lead configuration for No-trip testing

This is the default mode that the KTD40 will start in when turned on. This mode is most useful for testing at socket outlets, luminaires, wiring terminals, etc. in installations where the circuit under test may be protected by an RCD.

In No-trip mode the tester can be used with the mains lead when testing at 13A socket outlets, or the distribution board lead set for testing at other points in the circuit.

When testing with the KTD40 in No-trip mode the 3 colour coded prods/crocodile clips of the test lead should be connected to the corresponding Line, Neutral and Earth terminals.

This mode can be re-selected at any time by pressing button 5 labelled ‘No-trip’.

Test lead configuration

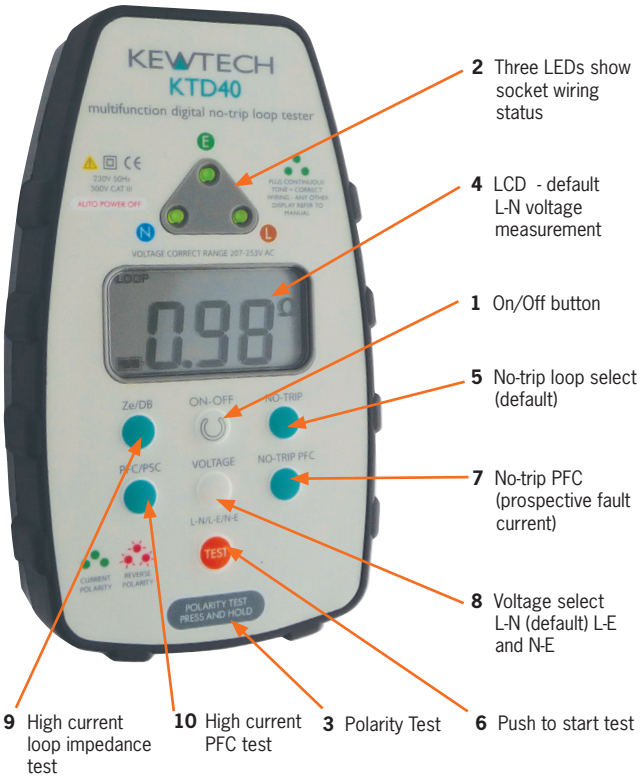
Lead configuration for High Current 2-wire testing with TLI feature

The TLI (True Loop Impedence) function is intended for use at distribution boards and similar points where you are measuring on the supply side of any Switch/RCD gear.

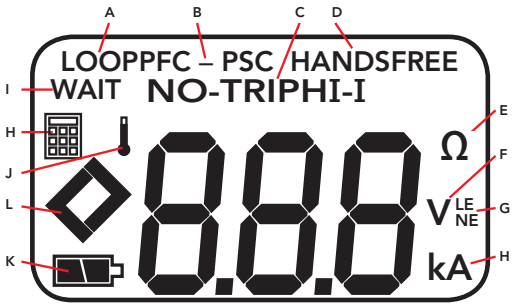
The TLI measurement function is selected by pressing button 9 labelled 'Ze/DB'. This function uses the maximum high current of the tester and requires the use of the distribution board lead set configured in 2-wire mode. Do not use this function with the mains lead or the distribution lead set in 3-wire mode.

To arrange the test leads in 2-wire mode pull the blue prod off the blue test lead and plug the exposed 4mm connector into the back of the green connector as shown below. You will now have the Earth and Neutral leads connected together ready for connection to the Earth or Neutral conductor to be tested.

Operation – a Detailed View of the KTD40



Overview of the Display



A Loop reading selected (Ω)

B PFC/PSC prospective fault current / prospective short circuit current reading selected (A/kA)

C Loop test mode selected – no trip (default) or Hi-I (high current)

D HANDSFREE operation

E Ohms symbol

F Volts (AC)

G Voltage measurement function L-N (default) L-E and N-E

H Fault current

I Wait – result calculation in progress

J Wait – tester has gone over operating temperature

K Battery Condition (=good)

L Greater than (>) less than (<) indication

Loop-PFC/PSC Testing

1 Power ON/OFF – Pressing this button turns the KTD40 on and pressing again turns the unit off. Intelligent auto power-off occurs after 3 minutes of inactivity, but for safety the instrument stays powered if it is displaying a socket wiring fault.

2 When the KTD40 is first connected to a live socket it will automatically test the socket wiring to establish that the circuit wires have been connected to the correct terminals on the back of the socket. If all three LEDs light GREEN and no sound is emitted the wiring status is correct and you can proceed to the incoming supply polarity test (step 3).

A fault with the socket wiring will be indicated by an audible alternating tone and the LEDs, at least one of which will be red or orange, will flash. If a fault indication is given – DO NOT PROCEED – investigation and remedial action is required before you can conduct a loop test.

If this happens placing your thumb on the grey coloured polarity test pad will now activate the 'fault location' function. With your thumb firmly on the pad check the indication given by the LEDs against the chart on the back cover to identify where the main problem lies.

Note: The colour of the LEDs may change when the pad is touched.

3 PRESS AND HOLD Incoming supply Polarity Test – this important test is discussed in full on page 3 of this manual, please read.

To conduct the test with all three LEDs lit GREEN place your thumb on the grey coloured polarity test pad area. If the supply polarity is correct there will be no change in indication and you can proceed to step 4. If the supply polarity has been reversed the three LEDs will turn red and flash.

If this happens stop testing and notify the supply company immediately.

4 Check that the mains voltage is in the correct range 207–253V AC.

Note: All tests are inhibited until the mains voltage appears in the display.

5 NO-TRIP Your tester defaults to no-trip loop testing when you first switch on – button five re-selects no-trip loop test if you have selected other functions.

6 TEST A brief press of the test button will initiate the loop test and after a few seconds the result will be displayed (Important: see notes on page 4).

The KTD40 also has a HANDSFREE test function that is activated by pressing the test button before connecting to the mains supply. This is very useful for testing at luminaires or similar connecting strips when your hands are occupied by holding the test probes.

Loop-PFC/PSC Testing - continued

When using HANDSFREE mode with the distribution board test lead set always connect the Earth and Neutral poles before the Line, otherwise it will indicate a polarity fault and inhibit further testing.

HANDSFREE testing in No-trip mode.

The tester will automatically conduct the socket wiring test upon connection to the Live supply. If all is well it will immediately initiate a Loop test.

When the test is complete the result will be displayed for a few seconds before the display reverts to showing the L-N voltage.

The Loop test result can be recalled by pressing the No-trip button and the PFC/PSC result can be recalled by pressing the No-trip PFC button.

7 **NO TRIP PFC** Having carried out a No-trip Earth fault loop test – pressing this button calculates the PFC (Prospective Fault Current) by dividing the measured loop result into the measured L-E voltage.

8 **VOLTAGE** The default voltage measurement is made between L-N. Using this button you can override to measure L-E and as a final safety check measure the N-E voltage present.

9 **Ze/DB** This button selects the High Current True Loop Impedance mode. Use only with the test lead set configured for 2-wire mode (see page 6).

Connect the test leads to the two conductors being tested. The supply voltage (see step 8) will be displayed. A brief press of the test button will conduct the Loop test and the result will be displayed almost immediately.

Note: In 2-wire mode the voltage displayed will be that measured across the 2 conductors that the test leads are connected to. The display will show this as L-N regardless of whether they are connected across L-N or L-E.

HANDSFREE testing in High current 2-wire mode.
This function is particularly useful for testing at distribution boards and is activated by pressing the test button before connecting to the mains supply. The KTD40 will then automatically conduct a Loop test upon connection to the live supply and display the result. The supply voltage can be recalled by pressing the Voltage button and the PFC/PSC result can be recalled by pressing the No-trip PFC button.

10 **PFC/PSC** Prospective Fault Current/Prospective Short Circuit Current. Pushing this button divides the above TLI (True Loop Impedance) result into the voltage measured between the two points under test to give either the prospective short-circuit current (when L-N is tested) or the prospective earth fault current (when L-E is tested).

Specifications

Wiring Test

Detects missing E or N (>15kΩ)
Detects L-E or L-N swap
Detects Live – Earth/Neutral reversal by use of Polarity Test Pad

Phase – Neutral voltage measurement	± 1% ± 1V
Phase – Earth voltage measurement	± 1% ± 1V
Neutral – Earth voltage measurement	± 1% ± 1V

Loop Test

No trip mode 3 wire testing Phase – Neutral – Earth all connected
Test current <15mA at 253V AC

Range	Accuracy
0.00 to 9.99Ω	± 5% ± 5 digits
10.00 to 99.9Ω	± 3% ± 3 digits
100.00 to 500Ω	± 3% ± 3 digits

High current mode 2 wire testing Phase-Neutral or Phase-Earth connected using true impedance measurement – auto test (hands free) is selectable.

Range	Accuracy
0.00 to 9.99Ω	± 3% ± 3 digits

PFC/PSC Measurement

10A – 19.9kA	This is a calculated result using the loop test measurement but it will be inherently more accurate than traditional methods as the test is of impedance not solely resistance.

Over Voltage Protection

440V AC	No damage – complete recovery

Power

4 × AA batteries (not included)
Battery life (BS EN 61557) > 10,000 test (or shelf life of batteries installed)

Environmental

Operating Temperature Range	0°C to 40°C
Storage Temperature Range	–10°C to +60°C
Operating Humidity	93% RH @ 40°C
Size	157mm × 89mm × 39mm
Weight	400g

Condition Number	Wiring Condition	Supply Terminal			LED Display	Buzzer
		N	E	L		
		Socket Wiring				
1	Correct	N	E	L		Continuous
2	L-E reverse	N	L	E		Warble
3	L-N-E miswire	E	L	N		Warble
4	L-N reverse	L	E	N		Warble
5	L-N-E miswire	L	N	E		Warble
6	Faulty N / L-E miswire	NC	L	N		Warble
7	Faulty N / E miswire	NC	N	L		Warble
8	Faulty N	NC	E	L		Warble
9	Faulty N / L-E reverse	NC	L	E		Warble
10	Faulty E / L-N reverse	L	NC	N		Warble
11	Faulty E	N	NC	L		Warble
12	Faulty E / N miswire	E	NC	L		Warble
13	Faulty E / L-N miswire	L	NC	E		Warble
14	Faulty L / N-E miswire	L	N	NC		Warble
15	Faulty L / E miswire	N	L	NC		Warble
16	Faulty L / N-E miswire	E	L	NC		Warble
17	Faulty L / N miswire	L	E	NC		Warble
18	No Mains	NC	NC	NC		None

Above is the indication given when touching the touch pad.
LEDs will flash to indicate fault condition NC = No Connection

Kewtech Corporation Limited
Midas House, Unit 2b, Stones Courtyard, High Street, Chesham, Bucks HP5 1DE
T: **01494 792 212**
F: 01494 791 826
E: sales@kewtechcorp.com